Published in final edited form as:

Sex Transm Dis. 2018 September ; 45(9): e68–e71. doi:10.1097/OLQ.0000000000000839.

Characteristics of persons with repeat syphilis — Idaho, 2011–2015

Ahmed M. Kassem, MBBCh, PhD[1,2], **Jared Bartschi, MHE**[2], and **Kris K. Carter, DVM, MVPM**[2,3]

[1]Epidemic Intelligence Service, Division of Scientific Education and Professional Development, Centers for Disease Control and Prevention, Atlanta, GA

[2]Division of Public Health, Idaho Department of Health and Welfare, Boise, ID

[3]Office of Public Health Preparedness and Response, Centers for Disease Control and Prevention, Atlanta, GA

Abstract

During 2011–2015 in Idaho, 14 (7%) of 193 persons with early syphilis had repeat syphilis. Persons with repeat infections were more likely to have had secondary or early latent syphilis ($P = 0.037$) and be infected with HIV ($P < 0.001$) compared with those having one infection.

SHORT SUMMARY

During 2011–2015 in Idaho, 14 (7%) of 193 persons with early syphilis had repeat syphilis. Persons with repeat syphilis were more likely to be infected with HIV.

INTRODUCTION

Syphilis, a sexually transmitted disease (STD) caused by the spirochaete bacterium *Treponema pallidum*, represents a significant disease burden in the United States and can cause serious health complications if left untreated.[1] More than 27,000 new primary and secondary syphilis diagnoses were reported in the United States during 2016.[1] In Idaho, a rural northwestern state with a population of 1.7 million, the syphilis incidence increased from 2.65/100,000 population in 2011 to 6.16/100,000 population in 2015.[2] During January 2015–December 2016, southwestern Idaho experienced a syphilis outbreak; during 2015, a total of three of 70 persons with syphilis associated with this outbreak were found to have had previous early syphilis during 2011–2014.[3] Although repeat syphilis was investigated in several areas in the United States including San Francisco,[4] Florida,[5] California,[6] San Diego,[7] and Baltimore;[8] we are not aware of published studies on repeat syphilis in the rural or northwestern parts of the United States. Previous studies indicate that repeat syphilis might

Address correspondence to: Ahmed M. Kassem, MBBCh, PhD, 450 West State Street, 4th Floor, Boise, ID 83702 (Telephone: 208-334-5959, akassem@cdc.gov).

Conflicts of interest: None declared.

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contribute to increased *T. pallidum* transmission.[4–8] Identifying characteristics of persons with repeat syphilis can be used to target and enhance the delivery of syphilis prevention interventions.[4–8] Our primary objective in this investigation was to identify characteristics among persons in Idaho with repeat syphilis.

METHODS

We analyzed surveillance records of syphilis cases reported to the Idaho Department of Health and Welfare (IDHW) during 2011–2015. Data were exported from the following data systems: STD Management Information System (included all syphilis reports), Enhanced Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) (HIV/AIDS) Reporting System, and National Electronic Disease Surveillance System Base System. Data were accessible only by approved program personnel on the secure IDHW server, and merged and de-duplicated using first name, last name, and date of birth by using Link Plus 2.0 software (Atlanta, GA, USA). We used the direct method and a cut off value of 8.0 in Link Plus to minimize failure to appropriately link cases. Identifying data were removed from the resultant dataset before analysis. The study was reviewed for human subjects protection by the Idaho Division of Public Health's Research Determination Committee and the Centers for Disease Control and Prevention; both determined the study to be nonresearch, public health practice.

We defined a person with repeat syphilis to be a person who had two or more reported cases of early syphilis (primary, secondary, or early latent stages) with dates of diagnosis during January 1, 2011 through December 31, 2015. A person with nonrepeat syphilis had early syphilis diagnosed once during January 1, 2011 through December 31, 2015. Syphilis cases were defined using the Council of State and Territorial Epidemiologists' surveillance case definitions for syphilis in place during the year of case report (1996 and 2014).[9] We included only early syphilis because the inclusive case definitions represent the closest proxy of incident infections.

All persons with repeat syphilis had documented evidence of appropriate serologic response to therapy after initial infection. We excluded persons who had early syphilis during 2006–2010 to reduce misclassification as a nonrepeat syphilis and because baseline characteristics during this period were less relevant to the recent scope of this study.

We performed analyses to address the following specific objectives: 1) describe and compare demographic, clinical, and epidemiologic characteristics of persons with repeat and nonrepeat syphilis; 2) examine whether demographic, clinical, and epidemiologic characteristics of persons with repeat syphilis infection vary by HIV infection status; and 3) explore how epidemiologic characteristics of persons with repeat syphilis might have changed between initial and repeat infections. Additionally, we examined the proportion of syphilis contacts who received syphilis testing or treatment. For all comparisons, we used two-sample median test for continuous variables and Fisher's exact test for categorical variables. For the analyses of change between initial and repeat infections, we used McNemar's test or Bowker's test of symmetry for categorical variables, and Wilcoxon

signed rank sum test for continuous variables. We used SAS version 9.3 (SAS Institute Inc., Cary, NC) for all statistical analyses.

RESULTS

In total, 208 syphilis cases were diagnosed in 194 persons in Idaho during 2011–2015. Fourteen (7%) had two or more early syphilis diagnoses. From persons with nonrepeat syphilis, we excluded one person who had a prior syphilis diagnosis during 2006–2010 leaving a total of 193 persons in the analytic dataset. Baseline characteristics of persons with syphilis by number of infections are presented in Table 1. Among persons with repeat infection, all were male, 93% were white, 85% were non-Hispanic, and 91% had male sex partners. Compared with persons with nonrepeat syphilis, at baseline (first infection) persons with repeat syphilis more likely had secondary or early latent syphilis (93% versus 64%; $P = 0.037$), were infected with HIV (85% versus 30%; $P < 0.001$), and had a history of STD (82% versus 39%; $P = 0.009$). A significant difference was noted in geographic distribution between persons with repeat and those with nonrepeat syphilis, with a higher proportion of persons having repeat infection diagnosed while residing in eastern and southeastern Idaho. The observation time (defined as months between initial syphilis diagnosis and December 31, 2015) was longer among persons with repeat infection; however, this finding was not statistically significant. No significant differences in demographic, clinical, and epidemiologic characteristics were found among persons with repeat infection when compared by HIV infection status (data not shown). Table 2 shows the epidemiologic characteristics of persons with repeat syphilis by timing of infection; no significant changes were found in any characteristics between initial and repeat infections. No significant difference was observed in the proportion of syphilis case contacts who received syphilis testing or treatment between persons with repeat and nonrepeat infection (data not shown). In a post hoc analysis restricted to males, we did not find a significant difference between persons with repeat and nonrepeat infection by the indicator, men who have sex with men, defined as men who report having sex with men only or with both men and women (data not shown).

DISCUSSION

Compared with persons having nonrepeat infections, persons with repeat early syphilis more likely had secondary or early latent syphilis, were infected with HIV, and had a history of STD. All persons with repeat syphilis were males, and none had reported incarceration or exchanged sex for drugs or money. Overall, we found the proportion of persons with repeat infections (7%) is in line with proportions reported in previous studies that ranged from 2.5% to 20%.[4–8] Our finding that persons with repeat syphilis were more likely to be infected with HIV is consistent with previous studies that unanimously reported HIV infection as a risk factor for repeat syphilis. [4–8] This finding could be explained by biological (e.g., reduced immunity) and behavioral (e.g., increased risk-taking) factors, or possibly due to surveillance bias (i.e., frequent screening). In our study, the length of observation time was not a significant factor. Findings are also consistent with two previous studies that found no association between repeat infection and behaviors associated with risk of initial syphilis.[4,7] Notwithstanding missing and unknown data, results illustrating that

characteristics of persons with repeat syphilis did not vary between initial and repeat infection might suggest that those persons did not change their risk behaviors after their initial diagnosis. Our data did not include information about risk reduction interventions these persons might have received during or after initial infection, but this finding bolsters the cost-effective[11] recommendation for increased frequency of syphilis screening among populations at continued high risk for syphilis, including persons who are HIV- positive and MSM, as referenced in U.S. Preventive Services Task Force syphilis screening guidelines.[12] Strengths of this study include using statewide surveillance data; examining several demographic, clinical, and epidemiologic characteristics; and investigating repeat syphilis in a rural, northwestern U.S. state. This study also has limitations. We had a limited number of cases and, as such, we did not have sufficient statistical power to find small differences in any of our analyses. Our study also suffered from missing and unknown data, a common problem when using surveillance data. We did not examine serosorting behavior and possible association with repeat syphilis. Efforts to obtain more complete data during syphilis case and contact investigations would be informative to future studies. Finally, it is possible that our study missed repeat infections if persons with syphilis moved to another jurisdiction. In conclusion, characteristics identified in this study, e.g., HIV infection status and history of STD, could be used to enhance STD/HIV testing, interview, and partner services to prevent syphilis reinfection in Idaho. We recommend that providers consider increasing the frequency of syphilis screening in persons at risk of repeat infection. We also recommend that public health officials to continuously inform healthcare providers of changes to the epidemiologic distribution of syphilis in their jurisdictions.

Acknowledgments

Limited portions of this manuscript were presented as a poster at the 2017 Epidemic Intelligence Service Conference, April 24–27, 2017 – Atlanta, Georgia, and as an oral presentation at the 2017 Council of State and Territorial Epidemiologists Annual Conference, June 4–8, 2017 – Boise, Idaho.

Funding: No external sources of funding received.

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Table 1.

Baseline* characteristics of persons with syphilis infection by number of infections — Idaho, 2011–2015

Characteristics	Total† N = 193	≥2 Syphilis infections N = 14	1 Syphilis infection N = 179	*P*-value‡
Observation time, months, median (range)**	20 (0–57)	37 (5–56)	18 (0–57)	0.091
Demographic				
Age at diagnosis, years, median (range)	32 (18–68)	35 (22–58)	32 (18–68)	0.566
Sex, n (%)				0.370
Female	18 (9.3)	0 (0)	18 (10.1)	
Male	175 (90.7)	14 (100)	161 (89.9)	
Ethnicity, n (%)				1.000
Hispanic	30 (16.13)	2 (15.4)	28 (16.2)	
Non-Hispanic	156 (83.87)	11 (84.6)	145 (83.8)	
Unknown or missing	*7*	*1*	*6*	
Race, n (%)				1.000
White	174 (93.55)	13 (92.9)	161 (93.6)	
Non-White	12 (6.45)	1 (7.1)	11 (6.4)	
Unknown or missing	*7*	*0*	*7*	
Jurisdiction, Idaho public health district, n (%)				0.036
Panhandle Health District	12 (6.22)	0 (0)	12 (6.7)	
Public Health - Idaho North Central District	4 (2.07)	0 (0)	4 (2.2)	
Southwest District Health	38 (19.69)	2 (14.3)	36 (20.1)	
Central District Health Department	109 (56.48)	6 (42.9)	103 (57.5)	
South Central Public Health District	7 (3.63)	0 (0)	7 (3.9)	
Southeastern Idaho Public Health	11 (5.70)	4 (28.6)	7 (3.9)	
Eastern Idaho Public Health	12 (6.22)	2 (14.3)	10 (5.6)	
Clinical				
Syphilis stage, n (%)				0.048
Primary	66 (34.20)	1 (7.1)	65 (36.3)	
Secondary	57 (29.53)	5 (35.7)	52 (29.1)	
Early Latent	70 (36.27)	8 (57.1)	62 (34.6)	
HIV infection status (verbal or verified), n (%)				<0.001
Positive	50 (35.21)	11 (84.6)	39 (30.2)	
Negative	92 (64.79)	2 (15.4)	90 (69.8)	
Unknown or missing	*51*	*1*	*50*	
History of STD, n (%)				0.009
Yes	60 (41.96)	9 (81.8)	51 (38.6)	
No	83 (58.04)	2 (18.2)	81 (61.4)	
Unknown or missing	*50*	*3*	*47*	
Epidemiologic				

Characteristics	Total† N = 193	≥2 Syphilis infections N = 14	1 Syphilis infection N = 179	*P*-value‡
Gender of sex partners, n (%)				
For males				0.166
Female	30 (21.43)	0 (0)	30 (23.3)	
Male	94 (67.14)	10 (90.9)	84 (65.1)	
Female and male	16 (11.43)	1 (9.1)	15 (11.6)	
Unknown or missing	*35*	*3*	*32*	
For females				¶
Female	0 (0)	0 (0)	0 (0)	
Male	18 (100)	0 (0)	18 (100)	
Female and male	0 (0)	0 (0)	0 (0)	
Unknown or missing	*0*	*0*	*0*	
Number of sex or needle contacts	2 (0–28)	2 (0–5)	2 (0–28)	0.874
Anonymous sex in the past 12 months, n (%)				0.755
Yes	71 (46.10)	6 (54.6)	65 (45.5)	
No	83 (53.90)	5 (45.5)	78 (54.6)	
Unknown or missing	*39*	*3*	*36*	
Sex with injection drug user in past 12 months, n (%)				1.000
Yes	37 (25.34)	2 (20.0)	35 (25.7)	
No	109 (74.66)	8 (80.0)	101 (74.3)	
Unknown or missing				
Sex while high or intoxicated in past 12 months, n (%)				1.000
Yes	83 (58.87)	6 (60.0)	77 (58.8)	
No	58 (41.13)	4 (40.0)	54 (41.2)	
Unknown or missing	*52*	*4*	*48*	
Exchanged sex for drugs or money (give or receive) in past 12 months, n (%)				1.000
Yes	7 (4.93)	0 (0)	7 (5.3)	
No	135 (95.07)	10 (100.0)	125 (94.7)	
Unknown or missing	*51*	*4*	*47*	
Injection drug use in past 12 months, n (%)				0.691
Yes	26 (17.93)	1 (10.0)	25 (18.5)	
No	119 (82.07)	9 (90.0)	110 (81.5)	
Unknown or missing	*48*	*4*	*44*	
Non-injection drug use in past 12 months, n (%)				0.740
Yes	87 (60.84)	7 (70.0)	80 (60.2)	
No	56 (39.16)	3 (30.0)	53 (39.9)	
Unknown or missing	*50*	*4*	*46*	
Methamphetamine use, n (%)				0.255
Yes	45 (51.72)	2 (28.6)	43 (53.8)	

Characteristics	Total† N = 193	≥2 Syphilis infections N = 14	1 Syphilis infection N = 179	*P*-value‡
No	42 (48.28)	5 (71.4)	37 (46.3)	
Incarcerated in past 12 months, n (%)				0.213
Yes	24 (16.78)	0 (0)	24 (18.1)	
No	119 (83.22)	10 (100.0)	109 (82.0)	
Unknown or missing	*50*	*4*	*46*	

*Baseline is defined as initial diagnosis of syphilis during 2011–2015.

**Observation time is defined as months between initial syphilis diagnosis and December 31, 2015.

†Total number of observations for each variable varies because of unknown or missing information.

‡Based on two-sample median test for continuous variables and Fisher's exact test for categorical variables.

¶Statistics were not computable.

Table 2.

Epidemiologic characteristics of persons with repeat syphilis infection (N = 14*) by timing of infection — Idaho, 2011–2015

Characteristics	Initial infection	Repeat infection	*P*-value**
Gender of sex partners, n (%)			†
Female	0 (0)	0 (0)	
Male	8 (88.9)	9 (100.0)	
Female and male	1 (11.1)	0 (0)	
Number of sex or needle contacts	2 (0–5)	1 (0–7)	1.000
Anonymous sex in the past 12 months, n (%)			0.655
Yes	4 (50.0)	3 (37.5)	
No	4 (50.0)	5 (62.5)	
Sex with injection drug user in the past 12 months, n (%)			0.317
Yes	2 (25.0)	3 (37.5)	
No	6 (75.0)	5 (62.5)	
Sex while high or intoxicated in past 12 months, n (%)			0.564
Yes	4 (50.0)	5 (62.5)	
No	4 (50.0)	3 (37.5)	
Exchanged sex for drugs or money (give or receive) in past 12 months, n (%)			†
Yes	0 (0)	0 (0)	
No	8 (100.0)	8 (100.0)	
Injection drug use in the past 12 months, n (%)			0.317
Yes	1 (12.5)	2 (25.0)	
No	7 (87.5)	6 (75.0)	
Non-injection drug use in past 12 months, n (%)			0.564
Yes	6 (75.0)	7 (87.5)	
No	2 (25.0)	1 (12.5)	
Methamphetamine use, n (%)			1.000
Yes	2 (40.0)	2 (40.0)	
No	3 (60.0)	3 (60.0)	
Incarcerated in the past 12 months, n (%)			†
Yes	0 (0)	0 (0)	
No	8 (100.0)	8 (100.0)	

*Only persons with complete data for both baseline and repeat infection were included in these analyses.

**Based on McNemar's test for 2×2 tables or Bowker's test of symmetry for categorical variables and Wilcoxon signed rank sum test for continuous variables.

†Statistics were not computable.